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REMARKS

Applicants cancel claims 15-24, and add new claims 25-34. Claims 25-34 are pending, of which claims 25 and 26 are independent. No new matter has been added.

New claim 25 is derived from previously presented claims 15, 16, 18 and 19, and a further limitation which is supported in the Specification at page 11, lines 4-6. New independent claim 26 is derived from previously presented claims 15, 16, 18 and 20, and a further limitation which is supported in the Specification at page 11, lines 8-9. Support for new claims 27 and 31 can be found in the Specification at page 9, lines 8-10 and 18-21. New claims 28 and 32 are derived from previously presented claim 17; new claims 29 and 33 are derived from previously presented claim 23; and new claims 30 and 34 are derived from previously presented claim 24. No new matter has been added.

Applicants respectfully submit that the pending claims define over the art of record.

Applicants note that the Examiner did not indicate receipt of a certified copy of priority documents filed on October 3, 2003 in the Office Action Summary. Applicants respectfully request the Examiner to confirm receipt of the above.

Rejection of Claims 15-22 under 35 U.S.C. §103

Claims 15 and 16 are rejected under U.S.C. §103(a) as being unpatentable over United States Patent Number 6,426,158 to Pratt et al (hereafter "Pratt") in view of United States Patent Publication Number 2003/0194590 to Cargnelli et al (hereafter "Cargnelli"). Claims 15-22 are rejected under U.S.C. §103(a) as being unpatentable over Japanese Patent Application Number 2000-357530 (hereafter "JP '530") in view of the Cargnelli reference.

In the foregoing claims amendments, Applicants cancel claims 15-24. As such, the U.S.C. §103(a) rejections of claims 15-22 are rendered moot.

New Claims

In the foregoing claim amendments, Applicants add new claims 25-34. New claims 25-34 are not anticipated by nor are they rendered obvious by the cited references.

The Pratt reference is generally directed to a method of diluting hydrogen gas exhausted from a fuel cell. The Pratt reference teaches that reacted fuel gas is transferred from the fuel cell 10 into a hydrogen diluting mechanism 16 prior to release into the atmosphere (Pratt, Figure 1 and abstract). The hydrogen diluting mechanism 16 is a porous frit (glass or metal) that contains a large amount of interstitial space (Pratt, column 3, lines 58-60). When the reacted fuel gas is passed into or onto the frit, it rapidly mixes with air that is trapped in the interstitial spaces (Pratt, column 3, lines 60-62).

The Cargnelli reference is generally directed to the management of gas and water in a fuel cell system. The Cargnelli reference teaches that fuel cell anode exhaust including excess hydrogen and water is recirculated by a pump along an anode recirculation line 60 connected to the anode outlet of the fuel cell 12 (Cargnelli, Figure 1 and paragraph 35). The anode recirculation line 60 connects back to the fuel supply line 20 (Cargnelli, Figure 1 and paragraph 35).

The JP ’530 reference is generally directed to humidification of a fuel cell system by collecting the moisture in exhaust gas. The JP ’530 reference teaches a jet pipe 40 (JP ’530, Figure 1 and paragraph 29). Discharged air 38 and discharged hydrogen gas 37 are introduced into the jet pipe 40 and thereafter discharged into the open air (JP ’530, Figure 1 and paragraph 29).

New Independent Claim 25

Applicants respectfully submit that the Pratt, Cargnelli and JP ’530 references, alone or in any combination, fail to teach or suggest at least the following feature of new independent claim 25: “diluting the hydrogen gas in the reservoir by operating a blower for a predetermined period of time to supply air to the reservoir after stopping generation of electric power, the predetermined period of time being calculated from a capacity of the reservoir and an amount of hydrogen gas discharged from the fuel cell.”

The Pratt reference teaches a hydrogen diluting mechanism 16 that is a porous frit (glass or metal) containing a large amount of interstitial space (Pratt, column 3, lines 58-60). The Pratt reference appears to teach that air exists in the hydrogen diluting mechanism 16 as interstitial air at all times. The Pratt reference fails to teach or suggest that air is supplied to the hydrogen diluting mechanism for a predetermined period of time, "the predetermined period of time being calculated from a capacity of the reservoir and an amount of hydrogen gas discharged from the fuel cell," as recited in claim 25. As such, Applicants respectfully submit that the Pratt reference does not teach or suggest "diluting the hydrogen gas in the reservoir by operating a blower for a predetermined period of time to supply air to the reservoir after stopping generation of electric power, the predetermined period of time being calculated from a capacity of the reservoir and an amount of hydrogen gas discharged from the fuel cell," as recited in claim 25.

The Cargnelli reference teaches that fuel cell anode exhaust including excess hydrogen and water is recirculated by a pump along an anode recirculation line 60 connected to the anode outlet of the fuel cell 12 (Cargnelli, Figure 1 and paragraph 35). The Cargnelli reference does not address diluting the anode exhaust in a reservoir. More particularly, the Cargnelli reference does not teach or suggest "diluting the hydrogen gas in the reservoir by operating a blower for a predetermined period of time to supply air to the reservoir after stopping generation of electric power, the predetermined period of time being calculated from a capacity of the reservoir and an amount of hydrogen gas discharged from the fuel cell," as recited in claim 25.

The JP '530 reference teaches introducing discharged air 38 and discharged hydrogen gas 37 into a jet pipe 40 which discharges the discharged air and discharged hydrogen gas into the open air (JP '530, Figure 1 and paragraph 29). Nonetheless, the JP '530 reference does not teach or suggest "diluting the hydrogen gas in the reservoir by operating a blower for a predetermined period of time to supply air to the reservoir after stopping generation of electric power, the predetermined period of time being calculated from a capacity of the reservoir and an amount of hydrogen gas discharged from the fuel cell," as recited in claim 25.

In view of the foregoing arguments, Applicants respectfully submit that the Pratt, Cargnelli and JP '530 references, alone or in any combination, fail to teach or suggest each and every feature of independent claim 25. As such, Applicants respectfully submit that claim 25 defines over the art of record.

New Independent Claim 26

Applicants respectfully submit that the Pratt, Cargnelli and JP '530 references, alone or in any combination, fail to teach or suggest at least the following feature of new independent claim 26: "diluting the hydrogen gas in the reservoir by operating a blower until a concentration of hydrogen in the reservoir is below a predetermined value to supply air to the reservoir after stopping generation of electric power, the concentration of hydrogen in the reservoir being monitored using a hydrogen sensor."

As set forth above, the Pratt reference teaches a hydrogen diluting mechanism 16 (Pratt, column 3, lines 58-60). Nonetheless, the Pratt reference does not address using a hydrogen sensor to monitor the concentration of hydrogen in the hydrogen diluting mechanism. As such, Applicants respectfully submit that the Pratt reference does not teach or suggest "diluting the hydrogen gas in the reservoir by operating a blower until a concentration of hydrogen in the reservoir is below a predetermined value to supply air to the reservoir after stopping generation of electric power, the concentration of hydrogen in the reservoir being monitored using a hydrogen sensor," as recited in claim 26.

As set forth above, the Cargnelli reference does not address diluting the anode exhaust in a reservoir. More particularly, the Cargnelli reference does not teach or suggest "diluting the hydrogen gas in the reservoir by operating a blower until a concentration of hydrogen in the reservoir is below a predetermined value to supply air to the reservoir after stopping generation of electric power, the concentration of hydrogen in the reservoir being monitored using a hydrogen sensor," as recited in claim 26.

As set forth above, the JP '530 reference teaches a jet pipe 40. A jet pipe is not synonymous with a reservoir as recited in claim 26. Moreover, the JP '530 reference does not address using a hydrogen sensor to monitor the concentration of hydrogen in the jet pipe or in any dilution reservoir. As such, Applicants respectfully submit that the JP '530 reference does not teach or suggest "diluting the hydrogen gas in the reservoir by operating a blower until a concentration of hydrogen in the reservoir is below a predetermined value to supply air to the reservoir after stopping generation of electric power, the concentration of hydrogen in the reservoir being monitored using a hydrogen sensor," as recited in claim 26.

In view of the foregoing arguments, Applicants respectfully submit that the Pratt, Cargnelli and JP '530 references, alone or in any combination, fail to teach or suggest each and every feature of independent claim 26. As such, Applicants respectfully submit that claim 26 defines over the art of record.

New Dependent Claim 27

Claim 27 depends upon independent claim 25, and adds separate and patentable limitations to claim 25. As such, for this and the reasons set forth above, Applicants respectfully submit that the dependent claim also defines over the art of record.

Moreover, Applicants respectfully submit that the Pratt, Cargnelli and JP '530 references, alone or in any combination, fail to teach or suggest at least the following feature of claim 27: "sucking the hydrogen gas into a cathode exhaust gas pipe arranged in the reservoir, through suction holes provided in the cathode exhaust gas pipe by the action of exhaust air flowing in the cathode exhaust gas pipe and discharged to outside."

The above feature of the claimed invention recited in claim 27 requires the hydrogen gas to pass through the cathode exhaust gas pipe before it is discharged to the outside. The feature also requires the hydrogen gas to be diluted with the cathode exhaust gas in the cathode exhaust gas pipe irrespective of whether or not the inside of the reservoir is under negative or positive pressure. Even when the concentration of the hydrogen gas in the reservoir becomes high, the amount of the hydrogen gas sucked into the cathode exhaust gas pipe is kept constant depending on the flow rate of the cathode exhaust gas passing through the cathode exhaust gas pipe. The amount of hydrogen sucked in by the negative pressure increases as the flow rate increases, and decreases as the flow rate decreases. Thus, the above feature of the claimed invention maintains the concentration of the hydrogen gas below a predetermined value.

The Pratt reference fails to teach or suggest "sucking the hydrogen gas into a cathode exhaust gas pipe arranged in the reservoir, through suction holes provided in the cathode exhaust gas pipe by the action of exhaust air flowing in the cathode exhaust gas pipe and discharged to outside," as recited in claim 27. Moreover, the Pratt reference does not teach or suggest the functionality enabled by this feature. In a hydrogen diluting mechanism that is open to the atmosphere, as in the Pratt reference, the high-concentration hydrogen gas would disadvantageously be forced out from the reservoir before it is diluted sufficiently when the inside of the reservoir is under a positive pressure. Thus, the concentration of the hydrogen gas would not be maintained below a predetermined value in the reservoir.

The Cargnelli reference fails to teach or suggest "sucking the hydrogen gas into a cathode exhaust gas pipe arranged in the reservoir, through suction holes provided in the cathode exhaust gas pipe by the action of exhaust air flowing in the cathode exhaust gas pipe and discharged to outside," as recited in claim 27, as the Cargnelli reference does not address a hydrogen diluting mechanism.

The JP '530 reference fails to teach or suggest "sucking the hydrogen gas into a cathode exhaust gas pipe arranged in the reservoir, through suction holes provided in the cathode exhaust gas pipe by the action of exhaust air flowing in the cathode exhaust gas pipe and discharged to outside," as recited in claim 27. Moreover, the JP '530 reference does not teach or suggest the functionality enabled by this feature. The JP '530 reference teaches introducing discharged air 38 and discharged hydrogen gas 37 into a jet pipe 40 which discharges the discharged air and discharged hydrogen gas into the open air (JP '530, Figure 1 and paragraph 29). This construction would disadvantageously allow the concentration of discharged hydrogen to increase as the concentration of hydrogen in the exhaust gas increases.

In view of the foregoing arguments, Applicants respectfully submit that the Pratt, Cargnelli and JP '530 references, alone or in any combination, fail to teach or suggest each and every feature of dependent claim 27. As such, Applicants respectfully submit that dependent claim 27 also defines over the art of record.

New Dependent Claims 28-34

Claims 28-30 depend upon claim 25, and add separate and patentable limitations to claim 25. Claims 31-34 depend upon claim 26, and add separate and patentable limitations to claim 26. As such, for this and the reasons set forth above, Applicants respectfully submit that the dependent claims also define over the art of record.

For at least the foregoing arguments, new claims 25-34 are patentable over the cited references.

CONCLUSION

In view of the foregoing amendments and arguments, Applicants believe the pending application is in condition for allowance.

Applicants believe that no fee is due with this statement. However, if a fee is due, please charge our Deposit Account No. 12-0080, under Order No. IIW-031RCE from which the undersigned is authorized to draw.

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